Chapter 2: Physics in Action (p. 128)

2/27/15

Chapter Challenge

Criteria

Science narration — audio
- separate
- embeded
- en vivo

5 Video - 2-3 min < 6 min

10 Written script

5 entertaining

30 physics phacts (6) 5pt. ea

+3pt ea > 6

Section 1 Newton's First Law: (p. 132) 2/27/15

A Running Start

WDYS dog, mouse, lady bug, 5 kids on a soccer field
bird on the goal watching the ball go over the net
girl runs up to ball quickly + kicks over goal
Goalie watches in awe, ground hog watches
Boy kicks ball which lands near his feet
kicking harder - the ball travels further

WDYT blade + ice work together to glide because there is not a lot of friction, high force w/ small movement

force + weight of the hard kick caused the light ball to roll, force continues to act after the kick to keep the ball rolling

Section 1 Newton's First Law: A Running Start

(p. 132) 2/27/15

IWBAT

- describe Galileo's law of motion
- apply Newton's first law of motion
- recognize inertial mass as a property of matter,
- explain that speed depends on frame of reference.

I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

Section 1 Newton's First Law: A Running Start (p. 132)

2/27/15
3/02/15
3/03/15

Investigate

Hold the ramp by placing no more than two fingers at each end and pressing the ends gently toward the center to cause a gentle bend.

Section 1 Newton's First Law: A Running Start

3/03/15

Physics Talk (p. 134)

inertia in er sha

Galileo's law of inertia – the natural tendency of an object to remain at rest or to keep moving with constant speed in a straight line

Objects do not stop on their own, but stop because there is a frictional force working that you cannot see that is the force that stops the object.

Newton's First Law of Motion – in the absence of an unbalanced force, an object at rest remains at rest and an object in motion remains in motion with a constant speed in a straight-line path

Section 1 Newton's First Law: A Running Start

3/03/15

Physics Talk (p. 134)

Inertia - the natural tendency of an object to remain at rest or to remain moving with constant speed in a straight line

mass ↑ inertia ↑

greater mass = greater inertia

kilogram (kg) - measure of mass

1 kg ≈ 2.2 lb pound≠mass

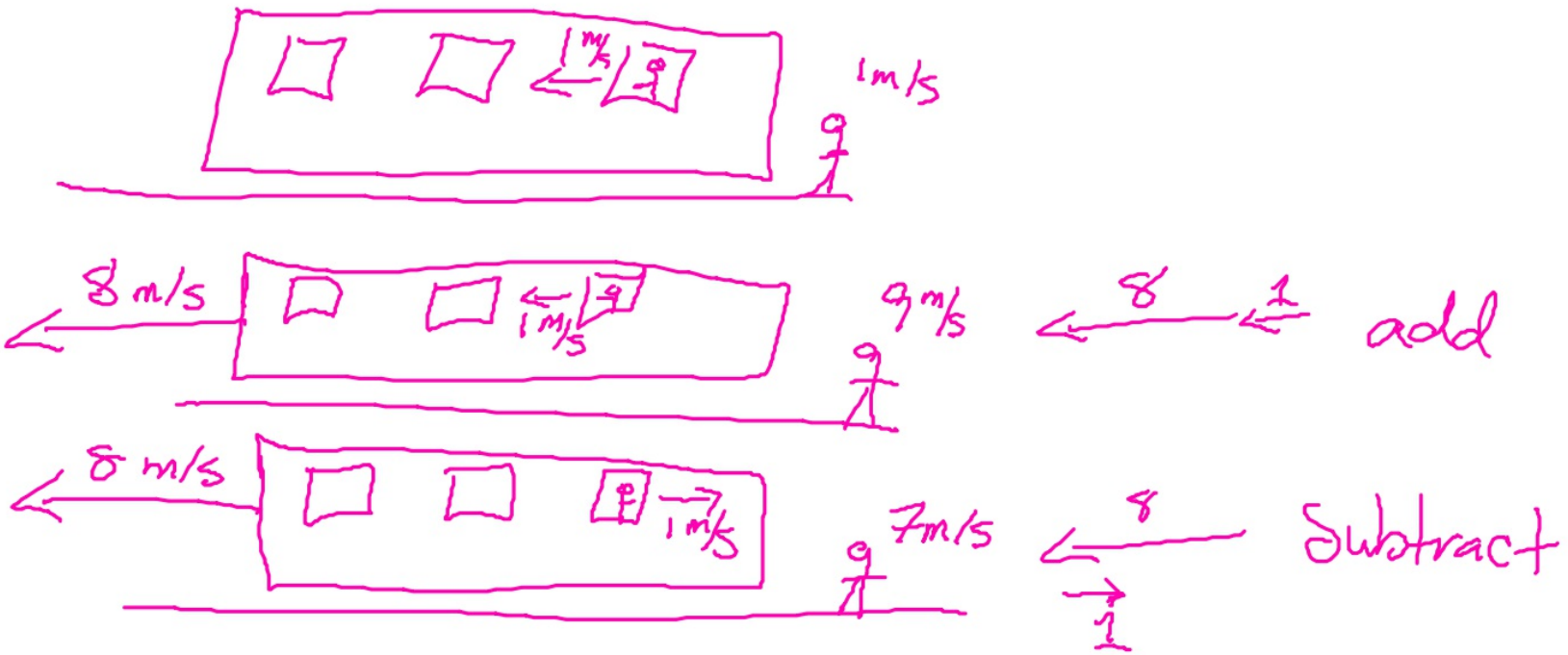
Section 1 Newton's First Law: A Running Start

3/03/15
3/04/15

Physics Talk (p. 134)

$$v_{jay} = v_h + v_e + v_s + v_{run}$$

Frames of Reference – What are you comparing it to?



Section 1 Newton's First Law: A Running Start

3/04/15

Physics Talk (p. 134)

wünderbar

Section 1 Newton's First Law: A Running Start

3/04/15

Complete:
Checking Up (p. 138) #1, 2, 5, & 6
Physics to Go (pp. 143-144) #1-4, & 10

WDYS Guy on his way to school is walking slowly w/ his dog + a snail, looks tired like falling asleep while walking, lots of small steps

Guy is running w/ bouquet of flowers w/ dog impatient to see gf, face shows enthusiasm, fewer steps + farther apart

WDYT absolutely fast, like Lightning McQueen car chase, running for their life, KG's driving

IWBAT

- give examples of distance, time, speed, and acceleration
- differentiate between instantaneous and average speed
- recognize when motion is accelerated
- calculate average speed and acceleration.

I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

Section 2 Constant Speed and Acceleration: Measuring Motion p. 145

3/05/15

Investigate:

- One set of tapes and graphs per team
- Please use graph paper to set up your graphs
- Each dot is placed every 1/60th of a second ... 60 dots are drawn each second

Complete Investigate steps 7-11.

3/06/15

Physics Talk (p. 148)

$$a = \frac{v_f - v_i}{\Delta t} = \frac{2 - 5}{2} = \frac{-3}{2}$$

$$v_{avg} = \frac{\text{distance travelled}}{\text{time taken}} = \frac{156.6\ mi}{2.5\ h} = 62.6\ mi/h$$

$a \left(\frac{m/s}{s}\right)$ $(m/s/s$ or $m/s^2)$

$v \left(\frac{m}{s}\right)$

v_i 10 $\frac{m}{s}$

v_f 20 $\frac{m}{s}$

Δt 10 s

$$a = \frac{20 - 10\left(\frac{m}{s}\right)}{10\ (s)} = 1\ \left(m/s/s\right)$$

Section 2 Constant Speed and Acceleration: Measuring Motion

3/10/15

Complete:
Checking Up (p. 151) #1-4
Physics to Go (pp. 154-156) #2, 3, 7, & 14

Homework:
Find 3 examples of Newton's First Law of Motion (or Galileo's Law of Inertia) in sports (Olympic or otherwise) this week. Be prepared to share out on Thursday.

WDYS A girl sweeping a ball, speeding up, hat flies off, dog needs car to keep up, moving faster takes more effort

WDYT Force? A push or pull interaction, a form of energy, the muscle you use to hit something, inertia

Bowling ball weighs more than the tennis ball so the tennis ball would go much further than the bowling ball

IWBAT

- identify the forces on an object
- determine when forces on an object are either balanced or unbalanced
- compare amounts of acceleration semi-quantitatively
- apply the definition of the Newton as a unit of force
- describe weight as the force due to gravity.

I will do this through team experiments and discussions with my team and the whole class. I will demonstrate my understanding through answering questions in the Physics Talk, Checking Up, and/or Physics to Go.

Section 3 Newton's Second Law: Push or Pull p. 157 3/11/15 3/12/15

Investigate:

Your items to push include:

- cart
- plastic bottle
- slotted weights

There are four pennies per group for steps 8 & 9.

Homework:

Find 3 examples of Newton's First Law of Motion (or Galileo's Law of Inertia) in sports (Olympic or otherwise) this week. Be prepared to share out on Thursday.

IWBAT identify the forces on an object, determine when forces on an object are either balanced or unbalanced, compare amounts of acceleration semi-quantitatively, apply the definition of the Newton as a unit of force, and describe weight as the force due to gravity.

Physics Talk (p. 160)

Evidence for Newton's Second Law of Motion (p. 160)

Larger mass, smaller acceleration } same force
smaller " , larger "

Mass + acceleration are inversely proportional

Larger force, larger acceleration } same mass
Smaller " , smaller "

force + acceleration directly proportional

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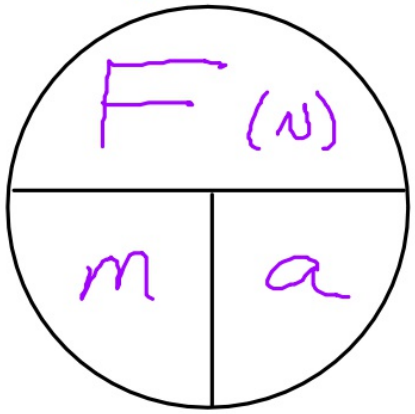
An Equation for Newton's Second law of Motion (p. 161)



$$a = \frac{F}{m} \qquad F = ma$$

$$\left(\frac{m}{s^2}\right) = \left(\frac{N}{kg}\right) \qquad (N) = \left(kg \cdot \frac{m}{s^2}\right)$$

$$m = \frac{F}{a}$$

$$(kg) = \left(\frac{N}{m/s^2}\right)$$

1 Newton = Force required to accelerate a mass of 1 kg at 1 m/s^2.

$$N = kg \cdot m/s/s$$

IWBAT identify the forces on an object, determine when forces on an object are either balanced or unbalanced, compare amounts of acceleration semi-quantitatively, apply the definition of the Newton as a unit of force, and describe weight as the force due to gravity.

Section 3 Newton's Second Law: Push or Pull

Newton: A Derived SI Unit with a Special Name (pp. 161-162)

IWBAT identify the forces on an object, determine when forces on an object are either balanced or unbalanced, compare amounts of acceleration semi-quantitatively, apply the definition of the Newton as a unit of force, and describe weight as the force due to gravity.

Section 3 Newton's Second Law: Push or Pull

Where There's Acceleration, There Must be an Unbalanced Force (p. 162)

everything exerts a force

If a force is unbalanced, an acceleration will occur.

If something cannot be measured, that does not mean it is zero.

IWBAT identify the forces on an object, determine when forces on an object are either balanced or unbalanced, compare amounts of acceleration semi-quantitatively, apply the definition of the Newton as a unit of force, and describe weight as the force due to gravity.

Calculations and Units (p. 163) & Using Measurements in Calculations (p. 164)

$N = Kg \cdot m/s^2$ Use the form which is useful.

Significant figures represent how carefully & Level of accuracy or precision of a measurement.

∴ Precise – finely measured
Accurate – right on target
} both

IWBAT identify the forces on an object, determine when forces on an object are either balanced or unbalanced, compare amounts of acceleration semi-quantitatively, apply the definition of the Newton as a unit of force, and describe weight as the force due to gravity.

Determining the Number of Significant Figures in a Measurement (p. 165)

- All non-zero digits (1-9)
- Zeros between non-zero digits ARE significant
  - 208 : 3 SF
  - 2008 : 4 SF
- Zeros trailing large numbers Are NOT sig.
  - 200 1 SF
- Zeros leading decimals are NOT sig.
  - 0.0165 3 SF
- Zeros trailing decimals ARE sig.
  - 2.20 3 SF
  - 1.0060 4 SF
  - 0.103 3 SF
  - 0.006 1 SF

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Gravity, Mass, Weight, and Newton's Second Law (p. 166)

Weight = $F_{gravity}$ always down towards the ground

$w(N) = m(kg)\, a_{grav.}\left(m/s^2\right)$

$w(N) = m(kg)\, 9.8\left(m/s^2\right)$ $\quad g_{earth} = 9.8\ m/s^2$

$490\,(N) = 50(kg)\, 9.8\left(m/s^2\right)$ $\quad 1\ kg \approx 2.2\ lb$

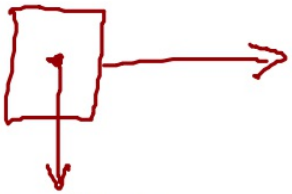
IWBAT identify the forces on an object, determine when forces on an object are either balanced or unbalanced, compare amounts of acceleration semi-quantitatively, apply the definition of the Newton as a unit of force, and describe weight as the force due to gravity.

Balanced and Unbalanced Forces (p. 167)

If forces are balanced there is no acceleration.
equal forces have arrows of the same length

no change

moving up



moving down to the right

IWBAT identify the forces on an object, determine when forces on an object are either balanced or unbalanced, compare amounts of acceleration semi-quantitatively, apply the definition of the Newton as a unit of force, and describe weight as the force due to gravity.

Adding vectors (p . 168)

IWBAT identify the forces on an object, determine when forces on an object are either balanced or unbalanced, compare amounts of acceleration semi-quantitatively, apply the definition of the Newton as a unit of force, and describe weight as the force due to gravity.

Complete:
Checking Up (p. 167) #1-4
Physics to Go (pp. 171-173) #3, 4, 10, 12, 15, & 18

IWBAT identify the forces on an object, determine when forces on an object are either balanced or unbalanced, compare amounts of acceleration semi-quantitatively, apply the definition of the Newton as a unit of force, and describe weight as the force due to gravity.